

FACT SHEET FOR PERMIT NO. ST 6110
SHARP LABORATORIES OF AMERICA, Inc.

Permit Type:
State Waste Discharge Permit

Permit Number:
ST 6110

Permittee:
Sharp Laboratories of America, Inc.
5700-5750 NW Pacific Rim Blvd.
Camas, Washington 98607

Facility:
(same)

Permitting Authority:
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

SUMMARY - TENTATIVE DECISION

The permitting authority has made a tentative decision to issue a permit, effective through June 30, 2008, to Sharp Laboratories of America, Inc., for the discharge from its electronics media research and development activities to the City of Camas sanitary sewer system. The tentative decision to issue the permit is based on a determination that the discharge would not interfere with the treatment process or otherwise be incompatible with the sewage works or result in pass-through of pollutants such that the city's NPDES permit would be violated.

The purpose of this fact sheet is to present the facts and reasoning on the basis of which the tentative decision was made. (The draft permit should accompany this fact sheet.)

PUBLIC INVOLVEMENT OPPORTUNITY

Interested persons are invited to comment on this tentative decision. Comments on the draft permit will be received for 30 days following the day of publication of the notice in the local newspaper, *The Camas Washougal Post*. (The target date for publication is June 10, 2003.)

All written comments submitted during the comment period will be retained by the permitting authority and considered in making the final decision on the application for a permit. The permitting authority will provide copies of the application, the tentative decision and the fact sheet on request. Persons who submit written comments will be notified of the final decision.

The applicant or anyone affected by or interested in the tentative decision may request a public hearing. The request must be filed within the 30-day comment period, and must indicate the interest of the party filing such a request and the reasons why a hearing is warranted. The permitting authority will hold a public hearing if it determines there is sufficient public interest.

Please submit written comments to the permitting authority at the address shown on the cover page of this fact sheet, to the attention of Industrial Permit Coordinator.

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BACKGROUND INFORMATION

APPLICANT

The Sharp Laboratories of America, Inc. (SLA), is a wholly owned subsidiary of Sharp Electronics Corporation in Mahwah New Jersey. SLA operates at the Camas, Washington location which is owned by Sharp Electronics Corporation (SEC). The property was transferred to SEC in April of 1999 when Sharp Microelectronics Technology, Inc. closed. SLA assumed responsibility for the functions and operations which generate wastewater and the State Waste Discharge Permit at that time.

SLA operates in parts of three constructed facilities on the Camas site. The first built in 1990 having 102,000 ft.², and a second built in 1993 having 56,000 ft.² are primarily occupied by Sharp Microelectronics of the Americas, a division of SEC, however space is rented to SLA for its operations. A third building owned and occupied by SLA was constructed in 1996 and has 54,000 ft.²

The applicable Standard Industrial Classification (SIC) Code for the activity is 8980 Miscellaneous Services – Research and Development. The laboratory operates eight hours per day, five days per week and employs about __ people.

PERMIT HISTORY AND STATUS

Sharp Laboratories of America, Inc. was issued its first State Waste Discharge Permit to discharge wastewater to the City of Camas municipal sanitary sewer system in 1993. Though the permit was effective to June 30, 1998, it was superseded by a new permit issued in 1995, expiring in 2000. (Twelve months monitoring for six heavy metals was added; otherwise the permit and statements of basis are unchanged). The current permit was issued in 2001, expiring June 30, 2003. (This current permit is unchanged from the previous permit, even inexplicably repeating the 12-month metals monitoring requirement.) The new “permit reauthorization” process was apparently invoked. Application for a new permit from the State of Washington was received June 24, 2002. The required written approval from the receiving sewer authority (City of Camas) was provided with the application. A separate letter from the sewer authority further authorized an upper pH limit on the discharge of 11, explaining that a higher pH would be a benefit to the treatment process.

SUMMARY OF COMPLIANCE WITH THE CURRENT PERMIT

The currently effective permit places limits on the discharge in terms of flow, pH, fluoride and total toxic organics (TTO). The permittee is required to monitor these parameters periodically. The current permit also required submission of plans for spill control, toxic organics management, solid waste management and treatment system operation. All of these plans were submitted on schedule and there have been no violations of the effluent limits, monitoring requirements or any other permit condition reported or noted during the current permit term.

INDUSTRIAL ACTIVITY

SLA is a research and development (R&D) facility, conducting R&D in the areas of multimedia (e.g. video, imaging, telecommunications, software, copiers, printers, etc.), integrated circuits (IC's), and Liquid Crystal Display-Thin Film Transistor (LCD-TFT) technologies. SLA does no manufacturing, the

main product is intellectual property and patents resulting from research and development activities. Only the IC and LCD laboratories generate wastewater. These lab operations are conducted in small "clean rooms" using equipment and processes which are consistent with those used by companies who manufacture such devices. Examples include photomasking, stripping, etching, chemical, metal organic, and physical vapor deposition, rinsing and drying of wafers and LCD glass.

The IC laboratory consists of two clean rooms and a chemistry lab occupying about 8700 ft². The IC lab performs research and analysis of various process techniques and materials for improving IC design, efficiency, size, and speed. This work is done using whole wafers, no working IC devices are created.

The LCD laboratory consists of one clean room occupying about 6000 ft². The LCD lab performs research and analysis of various process techniques and materials for improving LCD thin film transistor (TFT) design, efficiency, size, and speed. A complete LCD device consists of two glass panels and a polarizer with liquid crystal injected between them. The lab only performs research on the glass panel having the transistors. The second glass panel, polarizers and liquid crystal equipment and processes are not present, and therefore no working LCD devices are created.

PROCESS AREAS CONTRIBUTING TO WASTEWATER

The following is a general description of the process laboratories that generate wastewater, provided by the permit applicant.

IC Process Technology Labs (1, 2, and Synthesis):

These labs perform research and development related to various processes and chemicals used in the development of integrated circuits. Basic processes, chemicals, and equipment are those found in a typical wafer or IC manufacturing facility, but the volume is very low, as would be expected in R&D. Projects are funded on a contract basis with Japan and last from as little as 90 days to many months. The only product created is intellectual property for which patents are often sought and received.

LCD Process Technology Lab:

This lab performs research and development related to various processes and chemicals used in the development of Liquid Crystal Displays (LCD's). Basic processes, chemicals, and equipment are those found in a typical LCD manufacturing facility, but R&D is limited to only the Thin Film Transistor or TFT portion of a completed LCD device. Again, volume is very low, as would be expected in R&D. Projects are funded on a contract basis with Japan and last from as little as 90 days to many months. The only product created is intellectual property for which patents are often sought and received.

Other:

In addition to the process groups mentioned above, some wastewater is generated by basic facilities maintenance and janitorial cleaning services.

WASTE DISCHARGES TO MUNICIPAL SANITARY SEWER SYSTEM

Sources:

The majority of wastewater is generated from air pollution control (air scrubber) equipment. Some additional wastewater is generated from rinsing, etching, stripping, cleaning, anodic oxidation, polishing, and reverse osmosis processes.

Cleaning, etching, stripping, anodic oxidation and polishing processes utilize chemicals such as polishing slurry, sulfuric acid, phosphoric acid, hydrogen peroxide, ammonium hydroxide, ammonium tartarate,

ammonium fluoride, and hydrofluoric acid. The photodeveloping stations use tetramethylammonium hydroxide which is a surfactant-containing alkaline solution. Deionized water is used for all processes and rinsing, except for air scrubbing. Reverse osmosis and ion exchange are used to deionize the water. The above wastewater and concentrate from the deionization process enters the sanitary sewer via the neutralization treatment tank.

The photographic process for both IC and LCD processes consist of several rinses with deionized water. The rinses from these processes are combined with the wastewater streams and treated if necessary by a pH neutralization system prior to discharge to the sanitary sewer. The first rinse and high strength waste from etching and cleaning operations using hydrofluoric acid is separated and collected for treatment at an offsite hazardous waste facility.

Three air scrubbers are located on the roof or ground (one for each lab and one for the gas storage area). The air scrubbers treat exhaust from fume hoods, benches and any tools which use or generate corrosive emissions. The IC scrubber generates about 170 gallons per day, the LCD scrubber generates about 11,500 gallons per day, and the gas pad scrubber only generates wastewater in the event of an emergency (e.g. leak from a gas bottle). The estimated amount would be about 100 gallons. The air scrubbers run 24 hours per day to maintain static pressure in the clean rooms and to provide control in the event of an emergency leak or spill. The wastewater generated from the scrubbers is routed to the pH neutralization tanks (one in each lab) prior to being discharged to the sanitary sewer.

There are several solvents used in the lab operations including: isopropyl alcohol, acetone, toluene, xylene, n-methyl pyrrolidone, diethyl ether, etc. Spent solvents are collected and contained and excluded from the wastewater. (These spent solvents are managed offsite by a hazardous waste treatment facility.)

SLA currently employs flow monitoring systems which record the total amount process wastewater from each lab at the outlet of each pH treatment tank. The individual process flows are sporadic, as is the nature of R&D, and therefore not measured. Flows from the emergency and IC scrubbers are batch while the LCD scrubber is currently continuous flow. Scrubber flows and RO/DI reject water are not individually measured but are included in the combined total flow from each lab.

Pollutants:

Potential pollutants in the raw wastewaters from these R&D activities include residues of the various cleaning agents (solvents, surfactants, corrosives) and the eroded metals.

POLLUTANT CONTROLS

Prevention:

Spent solvents are collected, contained and removed to a hazardous waste management facility. Discharge of spent solvents with the wastewater is expressly prohibited by the permit. Further, the first rinse and high strength waste from etching and cleaning operations using hydrofluoric acid is separated and collected for treatment at an offsite hazardous waste facility.

Treatment:

Installed wastewater treatment is limited to pH control, only. The existing pH treatment units are a combination of batch and continuous flow. If the water is within required pH specifications, as sensed by a pH meter, it continuously flows out to the sanitary sewer. If however the pH probes detect a level outside of the specification, the tank valve closes and the water is automatically treated with sulfuric acid or sodium hydroxide until the proper pH is achieved. The valve then opens to release the wastewater to the sanitary sewer. The treatment system for the IC lab consists of series of five tanks holding a total of

1144 gallons while the treatment system for the LCD lab consists of a series of three tanks holding 990 gallons. The final discharge pH is continuously monitored and recorded.

TREATED WASTEWATER CHARACTERIZATION

Table 1 is a summary of effluent monitoring results reported by the permittee from May 2001 through December 2002. The previous permit limits are also shown for comparison. A previous permit added a requirement to monitor the presence of six heavy metals in the discharge, monthly for 12 months. Results of that testing were predominately below the method detection limits, and in every case well below the applicable criteria (the local sewer use ordinance).

TABLE 1 - DISCHARGE DATA

Analyte / Property	Permit Limits	Measured Range	No. of Measurements
Flow (mo. avg.)	35,500 gal./d.	4,000 – 15,000	20
Flow (daily avg.)	48,000 gal./d.	6,000 – 20,000	608
pH Range	5.5 – 9.0	6.0 – 8.8	(continuous)
Fluoride (mo. avg.)	17.4 mg/L	1.7 – 4.1	20
Fluoride (daily avg.)	32 mg/L	1.7 – 4.1	20
TTO (daily avg.)	0.02 mg/L	0.006 – 0.008	4
Cadmium	-	Not detected	17
Chromium	-	0.003 – 0.010	17
Copper	-	0.002 – 0.016	17
Lead	-	0.001 – 0.006	17
Nickel	-	Not detected	17
Zinc	-	0.005 – 0.011	17

POTW IMPACTS

The table illustrates the pollutant loadings from the subject discharge vis-à-vis the relevant design capacities of the POTW.

APPLICABLE STATE AND FEDERAL REQUIREMENTS

State law (RCW 90.48.160) requires any person who conducts a commercial or industrial operation of any type which results in the disposal of solid or liquid waste material into waters of the state, including commercial or industrial operators discharging solid or liquid waste material into sewerage systems operated by municipalities or public entities which discharge into public waters to procure a permit before disposing of such material. (This requirement does not apply to persons discharging only domestic sewage into a public sanitary sewerage system. There is also an exception for industrial discharges which are similar to sewage.) On application for a waste discharge permit, the department must issue a permit unless it finds that the discharge of the waste material as proposed in the application will pollute the waters of the state in violation of the public policy declared RCW 90.48.110. Such permits are subject to the relevant prohibitions and terms and conditions set forth in WAC 173-216, which should be explicitly incorporated in the permit by the permitting authority.

Federal regulations (40 CFR Part 403) establish responsibilities of government, industry and the public to implement national pretreatment standards to control pollutants which pass through or interfere with treatment processes in publicly owned treatment works or which may contaminate sewage sludge. These objectives are accomplished by certain general and specific discharge prohibitions which must be implemented as national pretreatment standards. These regulations apply to: *pollutants* from non-domestic sources covered by pretreatment standards, *POTW's* which receive wastewater from sources subject to national pretreatment standards, *sources* subject to pretreatment standards and *states* which have a NPDES program.

Under federal regulations, publicly-owned treatment works which are required to develop a pretreatment program (essentially those with capacities of 5 MGD or more *and* with one or more "significant industrial users") must establish and enforce specific limits to implement the discharge prohibitions. For "significant" users, "individual control mechanisms" are required. States with delegated NPDES permitting programs *and* an approved pretreatment program of their own may assume responsibility for implementing the POTW pretreatment program requirements. The state of Washington is one of these states, and has, except in a few cases, exercised this option. The permit required by state regulations serves as the "individual control mechanism".

For some specific industry categories, pretreatment standards have been set by EPA in federal regulations. These specific standards are intended to implement the discharge prohibitions and to assure there will be no pass-through, interference or other incompatibility with the sewage works caused by the discharges from these particular industries. When they are applicable, they must be set as effluent limits in the individual control mechanism (in this case, the State Waste Discharge Permit).

PERMIT DECISION

DECISION AND BASIS

The City of Camas POTW has a design flow greater than 5 MGD and significant industrial users, and is therefore required to have an approved pretreatment program. The State of Washington, with its own EPA-approved pretreatment program, has exercised its option to assume responsibility for implementing the POTW Pretreatment Requirements set forth in 403.8(f) in lieu of requiring the POTW to develop a pretreatment program.

The permitting authority has determined that the activity described in the permit application does not fall within any of the industry categories for which specific federal pretreatment standards have been developed, and that none of the general thresholds that define a significant industrial user are exceeded. There is, however, a potential for the pH of the untreated wastewater to fall outside EPA's general Pretreatment Standards (and the more stringent State of Washington prohibitions), so a permit (control mechanism) with specific limits for pH is required. The permit also incorporates expressly the narrative general and specific prohibitions listed in the federal Pretreatment Standards (40 CFR 403.5). Added to this list is a prohibition of the discharge of spent solvents. The basis for these specific limits and other conditions of the draft permit follow.

BASIS FOR DISCHARGE PROHIBITIONS AND LIMITATIONS (Special Condition S1)

Specific limitations on the pH of the discharge are imposed to implement the corrosive materials prohibitions the federal general and specific discharge prohibitions (40 CFR 403.5), and the state

Prohibited Discharges (WAC 173-216-060). These limits (within the range of 5 to 11) are based on the provisions of WAC 173-216-060(2)(1)(b)(iv). (This state regulatory requirement is more stringent than the federal pretreatment standard, which prohibits only discharges with pH below 5). There is a potential that the wastewaters, untreated, could violate this state regulatory provision, so that limits (and the means of control to meet them) are required.

The pH limits in the draft permit are different from those in the previous (current) permit. Those, according to the fact sheet, were based on the limits in the local sewer use ordinance, which were interpreted as “local limits” (though they are not “local limits” by EPA definition). The local sewer authority has, in any case, authorized an upper pH limit of 11, because a higher pH (higher alkalinity) discharge will benefit the treatment process in terms of nitrification.

The previous permit contained specific concentration limitations on fluoride and total toxic organics. These are absent from the new draft permit. Those limits were taken from EPA effluent limit guidelines and standards for the Electrical and Electronic Components Category, even though the Fact Sheet itself acknowledges and provides conclusive supporting evidence from EPA that they do not apply to research and development activities. Moreover, it imposed the effluent limit standards for direct discharge to surface water, rather than those for indirect discharge (via a POTW). Even if this were a manufacturing facility, the applicable effluent guideline would be the pretreatment standard, and the only applicable limited parameter in that category is TTO. Since it is not a manufacturing facility, even this one does not apply. Implicitly, EPA does not consider fluoride a pollutant of concern in discharges to POTWs from manufacturing facilities within this industry.

Worthy of note are the results of testing for these parameters (TTO and fluoride) over the previous permit term. The results were all well below the permit limits taken from the EPA effluent limit guidelines (see Table 1). Only two of the many compounds which make up the TTO test were detected. Fluoride levels are not much higher than the level that is purposely introduced by many informed purveyors into public drinking water supplies for dental cavity prevention. (These low results appear to uphold EPA’s decision not to apply the effluent limit guidelines to research activities.) On the basis of these findings, the previous TTO and fluoride limitations and monitoring requirements have been eliminated in this draft permit.

The 1995 permit required monthly testing of the discharge for six heavy metals, for 12 months, but imposed no limits. The permit reauthorized in 2000 unintentionally continued this requirement, and the monthly monitoring was continued through September 2002. The results (Table 1) show that metals levels are low, even relative to receiving water quality standards. The draft permit, therefore, includes no limits on these metals and discontinues the metals monitoring requirements.

The flow limit is based on the permit application and is for the purpose of establishing a permit fee category, only.

The permitting authority has determined that no other specific limits are required to implement the discharge prohibitions specified in state and federal regulations. These prohibitions remain applicable, as they do to all discharges to municipal sewerage systems, and are incorporated expressly in this draft permit. The permitting authority has added spent solvents to the list of prohibited discharges. This added prohibition, pertinent to this specific industrial activity, is based on the authority to require in permits the application of “all known, available and reasonable methods of control of discharges of pollutants” (WAC 173-216-110(1)(a)).

*BASIS FOR SPECIFIED MONITORING, REPORTING AND RECORD-KEEPING REQUIREMENTS
(Special Conditions S2, S3 & S4)*

The basis for the monitoring, reporting and record-keeping conditions in the draft permit are the requirements of the federal regulations 40 CFR 403.12(e), (f), (g) and (o). These are implemented through the obligation and authority given by the state regulation WAC 173-216-110(1)(g).

BASIS FOR THE GENERAL CONDITIONS

The General Conditions are standard conditions which are applicable to all state waste discharge permits according to the Washington Administrative Code (WAC). These permit requirements are, for the most part, contained in WAC 173-220-150. Others stem from WAC 173-220 sections 110, 120, 180, 190 and 200.